

PENDING CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

1. (Currently Amended) An apparatus, comprising:

a first Hadamard encoder for receiving a plurality of symbol streams for respective ones of a plurality of mobile stations and encoding each of the symbol streams with one of a plurality of covering sequences with pattern repetition to form a plurality of covered ~~streams~~ sequences;

a summer for summing less than all of the plurality of covered ~~sequences~~ streams to form a first Code Division Multiplexed (CDM) signal; and

~~a selector for selecting the summer from among a plurality of summers; and~~

a second encoder for covering the first CDM signal with ~~[[a]]~~ an I and Q Walsh covering sequence to form a first covered CDM signal.

2. (Currently Amended) The apparatus of claim 1, further comprising one or more channel gain blocks for receiving a plurality of gain values and multiplying the plurality of covered ~~streams~~ sequences by the plurality of gain values, respectively, prior to delivery to the summer.

3. (Canceled)

4. (Original) The apparatus of claim 1, further comprising a transmitter for receiving the first covered CDM signal and one or more additional covered signals, combining the first

covered CDM signal and the one or more additional covered signals to form a combined CDM signal, and transmitting the combined CDM signal to a remote station.

5. (Currently Amended) The apparatus of claim 1, further comprising:

a third Hadamard encoder for receiving a second plurality of symbol streams and encoding each of the symbol streams with the plurality of covering sequences with pattern repetition to form a second plurality of covered streams sequences;

a second summer for summing the second plurality of covered streams sequences to form a second Code Division Multiplexed (CDM) signal;

a fourth encoder for covering the second CDM signal with a second I and Q Walsh covering sequence to form a second covered CDM signal; and

a transmitter for transmitting the first covered CDM signal on an in-phase channel and the second covered CDM signal on a quadrature channel.

6. (Original) The apparatus of claim 1, wherein one or more of the plurality of symbol streams comprises command values, the command values indicating acknowledgement, negative acknowledgement, or acknowledge and continue.

7. (Currently Amended) The apparatus of claim 1, wherein the first Hadamard encoder segments the encoding time into two or more segments and covers each of the plurality of symbol streams with two or more sequences with pattern repetition, each sequence for covering during the two or more segments, respectively, and the sequence covering each symbol stream during a segment being unique to the respective symbol stream.

8. (Original) The apparatus of claim 7, wherein a first sequence is selected as a Hadamard sequence corresponding to a remote station identifier, and a second sequence is selected as a remote station identifier plus five modulo half the number of symbol streams in the plurality.

9. (Original) The apparatus of claim 7, wherein a first sequence is selected as a Hadamard sequence corresponding to a remote station identifier, and a second sequence is selected as a remote station identifier plus seven modulo half the number of symbol streams in the plurality.

10. (Currently Amended) The apparatus of claim 7, wherein each sequence is assigned in a time ~~varying~~ varying manner.

11. (Currently Amended) An apparatus, comprising:

a plurality of CDM encoders for receiving a plurality of symbol streams and producing a plurality of covered CDM signals, each CDM encoder comprising:

a first Hadamard encoder for receiving the plurality of symbol streams and encoding each of the symbol streams with one of a plurality of covering sequences with pattern repetition to form a plurality of covered streams ~~sequences~~;

a summer for summing the plurality of covered streams ~~sequences~~ to form a CDM signal;

a time multiplexer for receiving the plurality of covered CDM signals and forming a Time Division Multiplexed (TDM) signal comprising the plurality of covered CDM signals; and

a second encoder for covering the TDM signal with ~~[[a]]~~ an I and Q Walsh covering sequence to form a covered TDM/CDM signal configured for transmission in CDM fashion.

12. (Currently Amended) The apparatus of claim 11, wherein each CDM encoder further comprises one or more channel gain blocks for receiving a plurality of gain values and multiplying the plurality of covered streams ~~sequences~~ by the plurality of gain values, respectively, prior to delivery to the summer.

13. (Original) The apparatus of claim 11, further comprising a transmitter for receiving the covered TDM/CDM signal and one or more additional covered signals, combining the covered TDM/CDM signal and one or more additional covered signals to form a combined CDM signal, and transmitting the combined CDM signal to a remote station.

14. (Currently Amended) An apparatus, operable with a CDM signal, covered with a first I and Q Walsh covering sequence, comprising two or more sub-CDM signals, each of the two or more sub-CDM signals comprising a plurality of symbol sequences for reception by respective ones of a plurality of mobile stations covered by a second plurality of covering sequences with pattern repetition, respectively, the apparatus comprising:

a receiver for receiving the CDM signal;

a first despreader for despreading the received CDM signal with the first I and Q Walsh covering sequence to produce a despread CDM signal;

a second Hadamard despreader for despreading the despread CDM signal with one of the second covering sequences with pattern repetition to produce a recovered symbol sequence for a respective one of the plurality of mobile stations;~~and~~

~~a decoder for extracting the recovered symbol sequence from the plurality of symbol sequences for reception by respective ones of a plurality of mobile stations, the recovered symbol sequence being directed to the respective one of the mobile stations.~~

15. (Currently Amended) The apparatus of claim 14, wherein the second Hadamard despreader further despreads the despread CDM signal with one or more additional second covering sequences with pattern repetition to produce one or more additional recovered symbol sequences.

16. (Currently Amended) An apparatus, operable with a CDM signal, covered with a first I and Q Walsh covering sequence, comprising one or more TDM signals, each of the one or more TDM signals comprising one or more sub-CDM signals, each of the one or more sub-CDM signals comprising a plurality of symbol sequences covered by a second plurality of covering sequences with pattern repetition, respectively, the apparatus comprising:

a receiver for receiving the CDM signal;

a first despreader for despread the received ~~[[CUM.]]~~ CDM signal with the first I and Q Walsh covering sequence to produce a despread CDM signal;

a demultiplexer for selecting one of the TDM signals from the despread CDM signal; and

a second Hadamard despreader for despread the selected TDM signal with one of the second covering sequences with pattern repetition to produce a recovered symbol sequence.

17. (Currently Amended) A wireless communication device, comprising:

a first Hadamard encoder for receiving a plurality of symbol streams for respective ones of a plurality of mobile stations and encoding each of the symbol streams with one of a plurality of covering sequences with pattern repetition to form a plurality of covered streams ~~sequences~~;

a summer for summing the plurality of covered streams ~~sequences~~ to form a first Code Division Multiplexed (CDM) signal; and

~~a selector for selecting the summer from among a plurality of summers; and~~

a second encoder for covering the first CDM signal with ~~[[a]]~~ an I and Q Walsh covering sequence to form a first covered CDM signal.

18. (Currently Amended) A wireless communication device, comprising:

a plurality of CDM encoders for receiving a plurality of symbol streams and producing a plurality of covered CDM signals, each CDM encoder comprising:

a first Hadamard encoder for receiving the plurality of symbol streams and encoding each of the symbol streams with one of a plurality of covering sequences with pattern repetition to form a plurality of covered streams sequences;

a summer for summing the plurality of covered streams sequences to form a CDM signal;

a time multiplexer for receiving the plurality of covered CDM signals and forming a Time Division Multiplexed (TDM) signal comprising the plurality of covered CDM signals; and

a second encoder for covering the TDM signal with ~~[[a]]~~ an I and Q Walsh covering sequence to form a covered TDM/CDM signal configured for transmission in CDM fashion.

19. (Currently Amended) A wireless communication device, operable with a CDM signal, covered with a first I and Q Walsh covering sequence, comprising two or more sub-CDM signals, each of the two or more sub-CDM signals comprising a plurality of symbol sequences for reception by respective ones of a plurality of mobile stations covered by a second plurality of covering sequences with pattern repetition, respectively, the wireless device comprising:

a receiver for receiving the CDM signal;

a first despreader for despreading the received CDM signal with the first I and Q Walsh covering sequence to produce a despread CDM signal;

a second Hadamard despreader for despreding the despread CDM signal with one of the second covering sequences with pattern repetition to produce a recovered symbol sequence for a respective one of the plurality of mobile stations;~~and~~
~~a decoder for extracting the recovered symbol sequence from the plurality of symbol sequences for reception by respective ones of a plurality of mobile stations, the recovered symbol sequence being directed to the respective one of the mobile stations.~~

20. (Currently Amended) A wireless communication device, operable with a CDM signal, covered with a first I and Q Walsh covering sequence, comprising one or more TDM signals, each of the one or more TDM signals comprising one or more sub-CDM signals, each of the one or more sub-CDM signals comprising a plurality of symbol sequences covered by a second plurality of covering sequences with pattern repetition, respectively, the apparatus comprising:

a receiver for receiving the CDM signal;

a first despreader for despreding the received CDM signal with the first I and Q Walsh covering sequence to produce a despread CDM. signal;

a demultiplexer for selecting one of the TDM signals from the despread CDM signal; and

a second Hadamard despreader for despreding the selected TDM signal with one of the second covering sequences with pattern repetition to produce a recovered symbol sequence.

21. (Currently Amended) A wireless communication system, including a first wireless communication device comprising:

a first Hadamard encoder for receiving a plurality of symbol streams for respective ones of a plurality of mobile stations and encoding each of the symbol streams with one of a plurality of covering sequences with pattern repetition to form a plurality of covered streams sequences;

a summer for summing less than all of the plurality of covered streams sequences to form a first Code Division Multiplexed (CDM) signal; and

~~a selector for selecting the summer from among a plurality of summers; and~~

a second encoder for covering the first CDM signal with ~~[[a]]~~ an I and Q Walsh covering sequence to form a first covered CDM signal.

22. (Currently Amended) The wireless communication system of claim 21, further comprising a second wireless communication device comprising:

a receiver for receiving the first covered CDM signal;

a first despreader for despreading the received CDM signal with the first I and Q Walsh covering sequence to produce a despread CDM signal; and

a second Hadamard despreader for despreading the despread CDM signal with one of the second covering sequences with pattern repetition to produce a recovered symbol sequence.

23. (Currently Amended) A wireless communication system, including a wireless communication device comprising:

a plurality of CDM encoders for receiving a plurality of symbol streams and producing a plurality of covered CDM signals, each CDM encoder comprising:

a first Hadamard encoder for receiving the plurality of symbol streams and encoding each of the symbol streams with one of a plurality of covering sequences with pattern repetition to form a plurality of covered streams sequences;

a summer for summing the plurality of covered streams sequences to form a CDM signal;

a time multiplexer for receiving the plurality of covered CDM signals and forming a Time Division Multiplexed (TDM) signal comprising the plurality of covered CDM signals; and

a second encoder for covering the TDM signal with an I and Q Walsh covering sequence to form a covered TDM/CDM signal configured for transmission in CDM fashion.

24. (Currently Amended) The wireless communication system of claim 23, further comprising a second wireless communication device comprising:

a receiver for receiving the TDM/CDM signal;

a first despreader for despread the received TDM/CDM signal with the first I and Q Walsh covering sequence to produce a despread CDM signal;

a demultiplexer for selecting one of the TDM signals from the despread CDM signal; and

a second Hadamard despreader for despreading the selected TDM signal with one of the second covering sequences with pattern repetition to produce a recovered symbol sequence.

25. (Currently Amended) A method of multiplexing plurality of symbol streams, comprising:

Hadamard covering each of a plurality of symbol streams for respective ones of a plurality of mobile stations with one of a plurality of covering sequences with pattern repetition to form a plurality of covered streams sequences;

summing less than all of the plurality of covered streams sequences to form a first CDM signal; and

~~selecting the summer from among a plurality of summers; and~~

covering the first CDM signal with ~~[[a]]~~ an I and Q Walsh covering sequence to form a first covered CDM signal.

26. (Currently Amended) The method of claim 25, further comprising multiplying the plurality of covered streams sequences by a plurality of gain values, respectively, prior to summing.

27. (Original) The method of claim 25, further comprising:

combining the first covered CDM signal and one or more additional covered signals; and

transmitting the combined signals to one or more remote stations.

28. (Currently Amended) The method of claim 25, further comprising:

Hadamard covering each of a second plurality of symbol streams with one of the plurality of covering sequences with pattern repetition to form a second plurality of covered streams ~~sequences~~;

summing the second plurality of covered streams ~~sequences~~ to form a second CDM signal;

covering the second CDM signal with a second I and Q Walsh covering sequence to form a second covered CDM signal;

transmitting the first covered CDM signal on an in-phase channel; and

transmitting the second covered CDM signal on a quadrature channel.

29. (Original) The method of claim 25, wherein one or more of the plurality of symbol streams comprises command values, the command values indicating acknowledgment, negative acknowledgment, or acknowledge and continue.

30. (Currently Amended) The method of claim 25, wherein the covering of each of the plurality of symbol streams comprises:

segmenting the encoding time into two or more segments;

Hadamard covering each of the plurality of symbol streams with two or more sequences with pattern repetition, each sequence for covering during the two or more segments, respectively, and the sequence covering each symbol stream during a segment being unique to the respective symbol stream.

31. (Canceled)

32. (Original) The method of claim 30, wherein the two or more sequences are assigned in a time varying manner.

33. (Currently Amended) A method of multiplexing plurality of symbol streams, comprising:

Hadamard covering each of a plurality of symbol streams with one of a plurality of covering sequences with pattern repetition to form a plurality of covered streams ~~sequences~~;

summing subsets of the plurality of covered streams ~~sequences~~ to form a plurality of CDM signals;

time division multiplexing the plurality of CDM signals to form a TDM signal;
and

covering the first TDM signal with ~~[[a]]~~ an I and Q Walsh covering sequence to form a covered TDM/CDM signal configured for transmission in CDM fashion.

34. (Original) The method of claim 33, further comprising:

combining the first covered TDM/CDM signal and one or more additional covered signals; and

transmitting the combined signals to one or more remote stations.

35. (Currently Amended) A method of decoding a symbol sequence, comprising:
receiving a CDM signal, covered with a first I and Q Walsh covering sequence,
comprising two or more sub-CDM signals, each of the two or more sub-CDM signals
comprising a plurality of symbol sequences for reception by respective ones of a plurality
of mobile stations covered by a second plurality of covering sequences with pattern
repetition, respectively;

despreading the received CDM signal with the first I and Q Walsh covering
sequence;

Hadamard despreading the despread received CDM signal with one of the second
covering sequences with pattern repetition to produce a decoded symbol sequence for a
respective one of the plurality of mobile stations;~~;~~~~and~~

~~extracting the decoded symbol sequence from the plurality of symbol sequences
for reception by respective ones of a plurality of mobile stations, the decoded symbol
sequence being directed to the respective one of the mobile stations.~~

36. (Currently Amended) A method of decoding a symbol sequence, comprising:

receiving a CDM signal;

despreading the received CDM signal with a first I and Q Walsh covering
sequence;

time demultiplexing the despread received CDM signal to select a TDM signal;
and

Hadamard despreading the selected TDM signal with a second covering sequence
with pattern repetition to produce a decoded symbol sequence.

37. (Currently Amended) An apparatus, comprising:

means for Hadamard covering each of a plurality of symbol streams for respective ones of a plurality of mobile stations with one of a plurality of covering sequences with pattern repetition to form a plurality of covered streams sequences;

means for summing less than all of the plurality of covered streams sequences to form a first CDM signal; and

~~means for selecting the summer from among a plurality of summers; and~~

means for covering the first CDM signal with ~~[[a]]~~ an I and Q Walsh covering sequence to form a first covered CDM signal.

38. (Currently Amended) An apparatus, comprising:

means for Hadamard covering each of a plurality of symbol streams with one of a plurality of covering sequences with pattern repetition to form a plurality of covered streams sequences;

means for summing subsets of the plurality of covered streams sequences to form a plurality of CDM signals;

means for time division multiplexing the plurality of CDM signals to form a TDM signal; and

means for covering the first TDM signal with ~~[[a]]~~ an I and Q Walsh covering sequence to form a covered TDM/CDM signal configured for transmission in CDM fashion.

39. (Currently Amended) An apparatus, comprising:

means for receiving a CDM signal, covered with a first I and Q Walsh covering sequence, comprising two or more sub-CDM signals, each of the two or more sub-CDM signals comprising a plurality of symbol sequences for reception by respective ones of a plurality of mobile stations covered by a second plurality of covering sequences with pattern repetition, respectively;

means for despreading the received CDM signal with the first I and Q Walsh covering sequence; and

means for Hadamard despreading the despread received CDM signal with one of the second covering sequences with pattern repetition to produce a decoded symbol sequence for a respective one of the plurality of mobile stations; ~~and~~

~~means for extracting the decoded symbol sequence from the plurality of symbol sequences for reception by respective ones of a plurality of mobile stations, the decoded symbol sequence being directed to the respective one of the mobile stations.~~

40. (Currently Amended) An apparatus, comprising:

means for receiving a CDM signal;

means for despreading the received CDM signal with a first I and Q Walsh covering sequence;

means for time demultiplexing the despread received CDM signal to select a TDM signal; and

means for Hadamard despreading the selected TDM signal with a second covering sequence with pattern repetition to produce a decoded symbol sequence.

41. (Currently Amended) Processor readable media, operable to perform the following steps:

Hadamard covering each of a plurality of symbol streams for respective ones of a plurality of mobile stations with one of a plurality of covering sequences with pattern repetition to form a plurality of covered streams sequences;

summing less than all of the plurality of covered streams sequences to form a first CDM signal; and

~~selecting the summer from among a plurality of summers; and~~

covering the first CDM signal with ~~[[a]]~~ an I and Q Walsh covering sequence to form a first covered CDM signal.

42. (Currently Amended) Processor readable media, operable to perform the following steps:

Hadamard covering each of a plurality of symbol streams with one of a plurality of covering sequences with pattern repetition to form a plurality of covered streams sequences;

summing subsets of the plurality of covered streams sequences to form a plurality of CDM signals;

time division multiplexing the plurality of CDM signals to form a TDM signal;
and

covering the first TDM signal with ~~[[a]]~~ an I and Q Walsh covering sequence to form a covered TDM/CDM signal configured for transmission in CDM fashion.

43. (Currently Amended) Processor readable media, operable to perform the following steps:

receiving a CDM signal, covered with a first I and Q Walsh covering sequence, comprising two or more sub-CDM signals, each of the two or more sub-CDM signals comprising a plurality of symbol sequences for reception by respective ones of a plurality of mobile stations covered by a second plurality of covering sequences with pattern repetition, respectively;

despreading the received CDM signal with the first I and Q Walsh covering sequence;

Hadamard despreading the despread received CDM signal with one of the second covering sequences with pattern repetition to produce a decoded symbol sequence for a respective one of the plurality of mobile stations; ~~and~~

~~extracting the decoded symbol sequence from the plurality of symbol sequences for reception by respective ones of a plurality of mobile stations, the decoded symbol sequence being directed to the respective one of the mobile stations.~~

44. (Currently Amended) Processor readable media, operable to perform the following steps:

receiving a CDM signal;

despreading the received CDM signal with a first I and Q Walsh covering sequence;

time demultiplexing the despread received CDM signal to select a TDM signal;
and
Hadamard desreading the selected TDM signal with a second covering sequence
with pattern repetition to produce a decoded symbol sequence.